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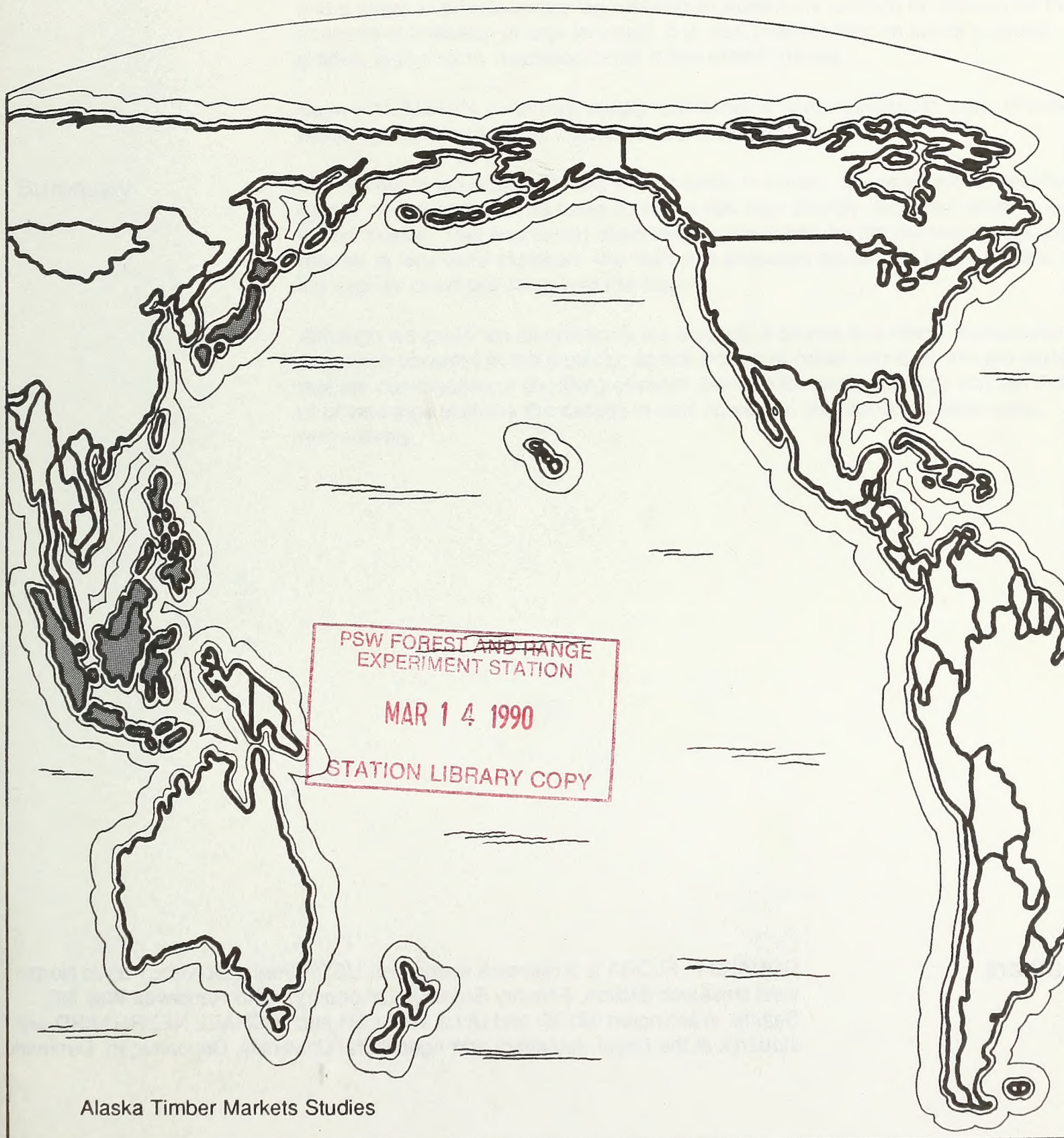
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# Tradeoffs and Interdependence in the Alaska Cant and Log Markets

Donald Flora, Ulla Woller, and Michael Neergaard





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## Authors

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## Abstract

**Flora, Donald; Woller, Ulla; Neergaard, Michael. 1990.** Tradeoffs and interdependence in the Alaska cant and log markets. Res. Pap. PNW-RP-422. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

During the 1980s, log exports from Alaska have risen while cant (lumber) exports have declined. Eight explanations for the difference between cant and log market behavior are explored. It seems that declining demand for wood products in Japan and a surge of private-sector log harvests in Alaska are enough to account for the apparent substitution of logs for cants. It is also possible that, in select (highest) grades, logs directly displaced cants in the export market.

**Keywords:** Markets (external), supply and demand (forest products), trade (Pacific Rim), log exports (Alaska), Alaska (timber trade).

## Summary

The advent of log exporting from private lands in Alaska coincided with a decline in Alaska cant exports. It has been surmised that logs directly displaced cants in the export market. That and seven alternative explanations for the decline of cant exports relative to logs were explored. The matter is important because a future decline in log exports could pull cants into the market.

Although we could not demonstrate the tradeoff, it seems that direct displacement may have occurred in the topmost, select grades of cants and logs. We are certain that the combination of declining offshore demand for cants and logs and the flush of private logs explains the decline in cant flows and the rise in log shipments, respectively.







## Introduction

Since the beginning of significant log exporting from Alaska in the late 1970s, total timber harvests in the State have been fairly constant; however, the share of exports represented by cants has declined, with a corresponding increase in log exports (fig 1)<sup>1</sup>. Figure 2 gives the ratio of lumber exports to log exports from Alaska and shows the relative decline of cant exports. It has seemed plausible to attribute the decline in cant activity, with its associated employment and mill operations, to encroachment in the marketplace by Alaska logs; this report compares that reasoning with several other explanations for the shift in the export mix.

The matter is timely because aggressive timber harvesting on Alaska's private lands is expected to reduce log exports sharply in the early 1990s (Seymour 1988). The encroachment concept implies that there will be a sharp rise in demand for cants and other sawn products.

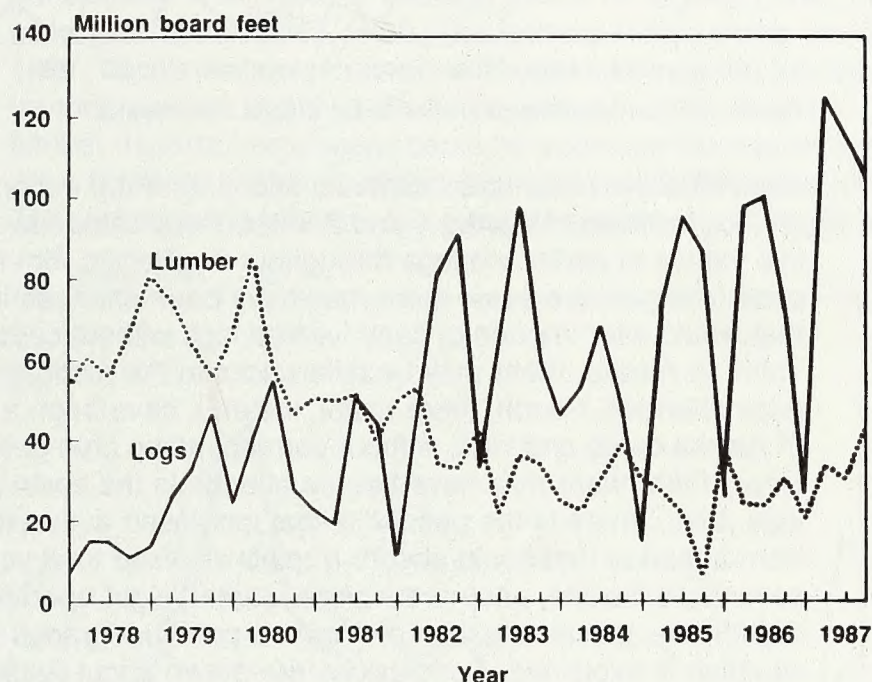


Figure 1—Quarterly softwood lumber and log exports from Alaska.

<sup>1</sup> In figure 1 and elsewhere, lumber volumes are in board feet, lumber tally; log volumes are in board feet, Scribner rule. Japanese volume units are interpreted in the appendix. For Alaska, cant production, cant exports, and lumber exports are assumed to coincide, although production and export of other lumber items have developed recently.



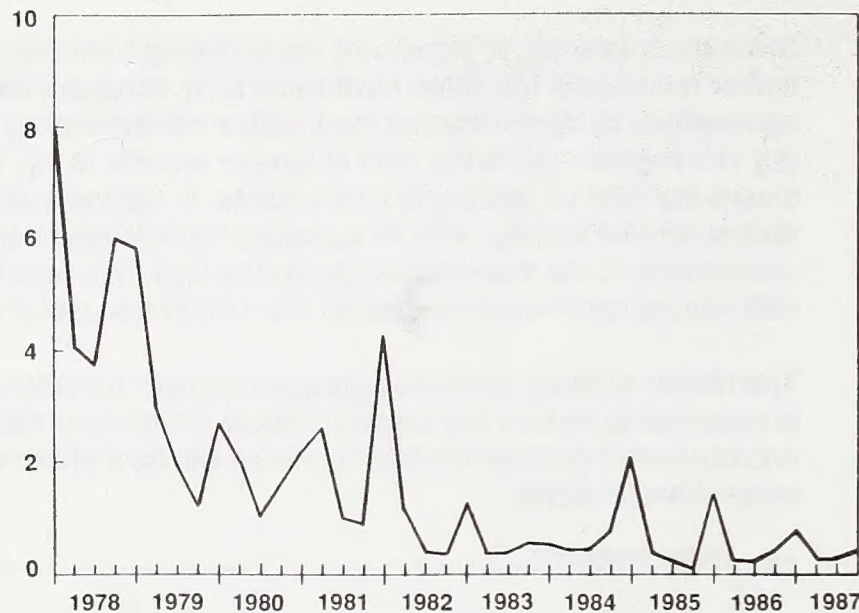


Figure 2—Ratio of softwood lumber to log exports from Alaska.

Eight different circumstances could account for the export changes between cants and logs shown in figures 1 and 2. First, there could have been a change in the relative values of cants and logs throughout the Pacific Rim market. Second, instead of price changes overseas, there may have been changes in physical factors offshore that would alter imports of cants versus logs without causing significant price shifts. Third, in Alaska, there may be differences in the response of log and cant supplies to price changes. Fourth, there might, instead, have been a change in the relative worth of Alaska cants and logs, without corresponding changes for material from other regions. Fifth, there may have been a change in the costs of producing cants versus logs. Sixth, there is the possibility that increased availability of logs displaced cants from a market that could absorb a relatively fixed total volume. Alternatively and seventh, a flexible, price-responsive market might operate indirectly on cant demand. Eighth, the special situation of Alaska's premium grades may be responsible. Each situation is explained. Conclusions are drawn about Alaska's cant and log markets for the past decade and about the implications for the future.

## Previous Work on the Subject

Gallagher and Mehrkens (1984) developed separate, hybrid supply and demand functions for Alaska cants and logs, differentiating not only between products but also between the two major Alaska timber species. They concluded that, based on relative prices of cants and logs, hemlock (*Tsuga* sp.) logs were competitive with cants, and spruce (*Picea* sp.) market behavior suggested that cants were "goods-in-process" for that species. An analytical foundation for the conclusions was not laid, however, and inconsistency was not explained.

An analysis of cant-log interaction was done.<sup>2</sup> Examined were the relation of species-differentiated cant prices to log shipments and other factors, with mixed results occurring.

<sup>2</sup> Les F. Miller, Alaska Region economist, USDA Forest Service, Juneau, Alaska 99802.



## Offshore Price Changes

Kim and others (1988) interviewed Asian buyers of Alaska cants and logs. They concluded that log vendors were conducting more aggressive marketing activities than were sellers of cants and that cants offer a narrower range of remanufacturing opportunities than do logs. The implication is that Alaska logs have competed directly with Alaska cants.

This is the first of the eight possible reasons for log-cant tradeoffs in Alaska markets. It is based on the principle that log and cant producers respond to price signals generated abroad.

Figure 3 compares lumber prices with log prices in Japan, Alaska's principal market, during the period of major log-export activity in Alaska; that is, since 1978. Each price series is an index of average prices for logs or cants; the fraction is 1.0 for the base year of the index, 1980. The indexes follow nearly the same track, except in 1987. Figure 4 shows the ratio of the lumber index to the log index. The ratio has trended upward slightly, with major spikes in 1979 and 1987. Other things equal, lumber imports from Alaska could be expected to respond to the upward relative-price trend for lumber in Japan; figures 1 and 2, however, indicate that they did not. Thus, changes in offshore price do not explain the changes in Alaska exports.

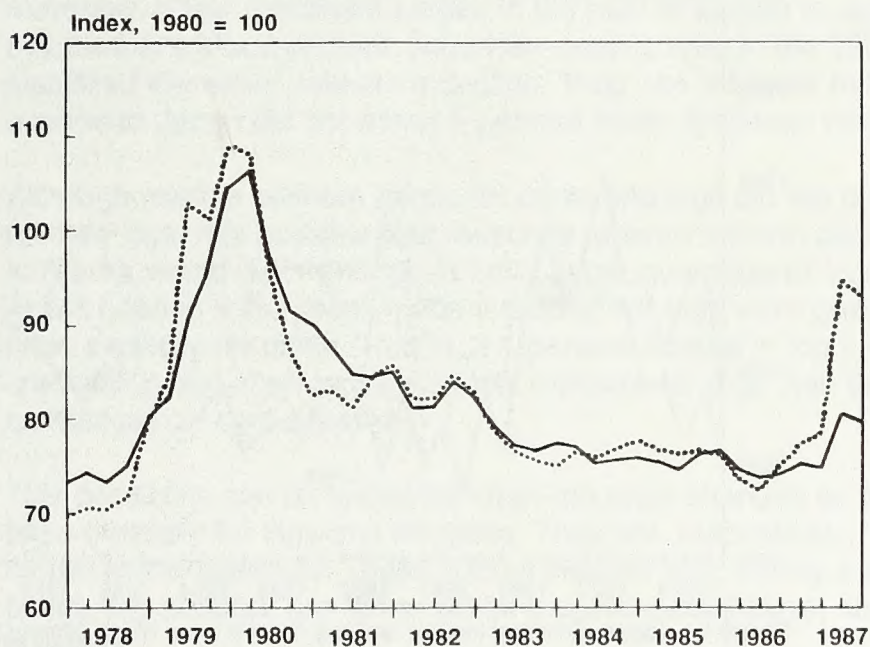


Figure 3—Japan lumber and domestic log price indexes.



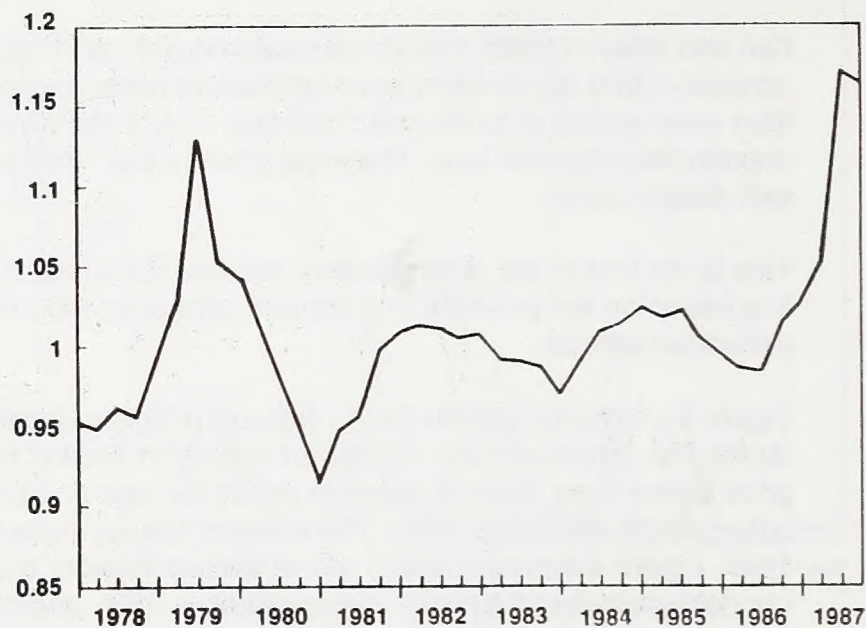


Figure 4—Ratio of Japanese domestic lumber to log price indexes.

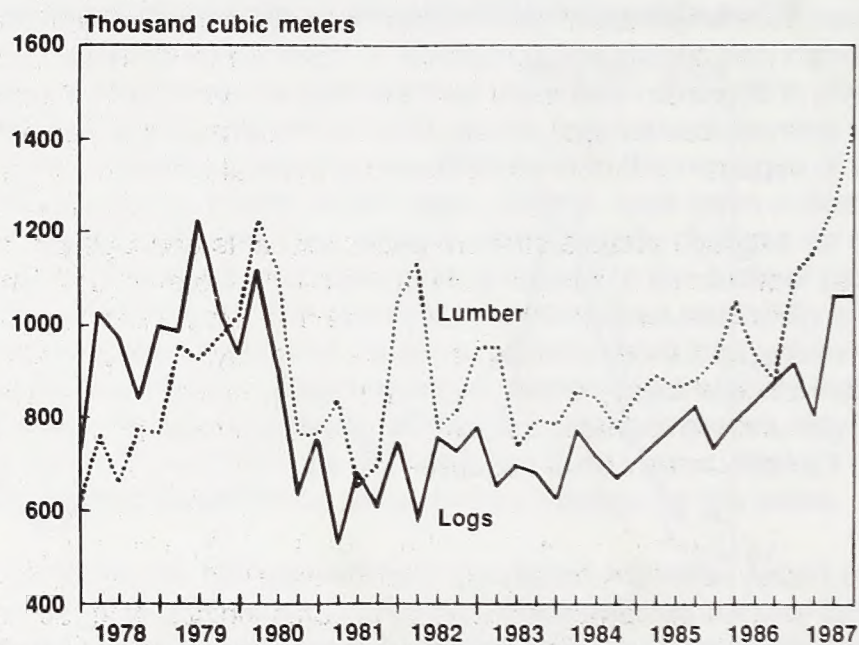


Figure 5—Japan softwood lumber and log imports from North America.

### Japan's Overall Import Mix

A second possibility is that there was a steadily increasing preference for logs in Japan, but that the preference was not reflected in relative prices, perhaps because nonprice elements affected purchases. Figure 5 shows a test used to assess Japan's imports of lumber and logs from other major sources, including the history of lumber and log imports from North America; volumes are expressed in thousands of cubic meters, the unit of measure employed in Japanese import data (Japan Lumber Journal 1979-88, Wood-products Stockpile Corp. 1988). In figure 6, the same data are shown as a ratio of lumber imports to log imports.



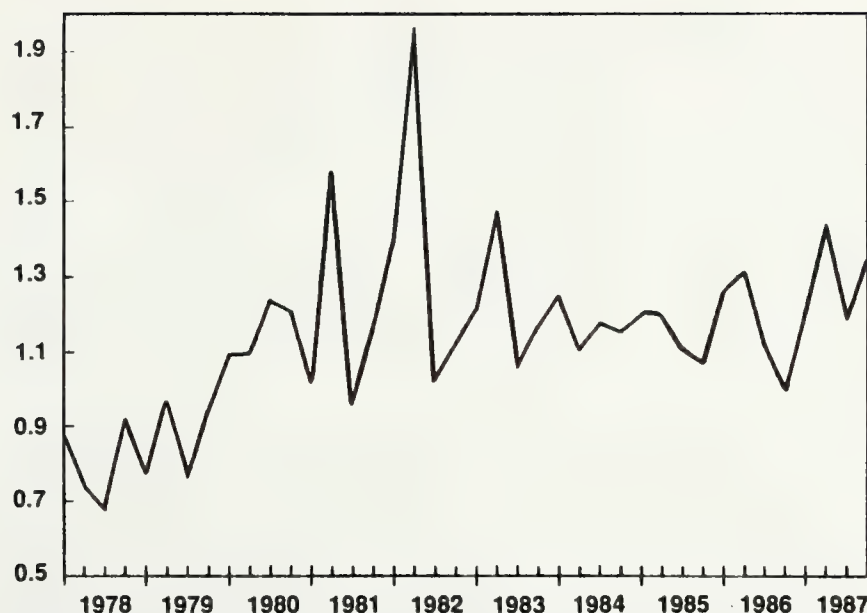


Figure 6—Ratio of Japan softwood lumber to log imports from North America.

Quarterly data show considerable fluctuations in both lumber and log activity with, inevitably, a few prominent surges in the ratio of lumber to logs. Overall, it seems that lumber's share of North American exports rose in the 1978 to 1981 period, and stabilized thereafter, without a decline. Thus, the increase in logs' share of Alaskan exports to Japan did not mirror a general North American trend.

### Supply Response in Alaska to Offshore Prices

Although relative offshore prices for cants and logs did not change in a way that favored logs, it is possible that response to even uniform cant and log price changes in Alaska would differ enough to bring larger quantities of logs into the market. This would happen if the supply-price elasticity<sup>3</sup> for logs were greater than the supply-price elasticity for cants. That is, a 1-percent decline in log prices might be associated with a larger percentage supply increase for logs than the counterpart effects of cant prices on cant supplies.

This possibility can be tested for short-run price changes by estimating the supply price elasticity for logs and for cants. They are, respectively, 1.33 and 0.83, as shown in the appendix. These figures indicate that, during a period of declining prices, log supplies are apt to shrink proportionately more, not less, than cant supplies.

### Alaska-Specific Price Changes

Earlier, it was shown that prices in Japan moved in ways that were seemingly perverse for the actual Alaska export experience for both cants and logs. Nonetheless, if prices trended differently for Alaska lumber and Alaska logs, that difference would explain varying volume trajectories. The price-trend divergence might have occurred because cants are a commodity rather peculiar to Alaska (Kim and others 1988), because the particularly high-quality products made from Alaska timber underwent different demand scenarios, or because the segment of the Japanese sawmill industry relying on Alaska cants or logs changed.

<sup>3</sup> Price elasticity is the percentage change in the export volume when prices change by 1 percent.



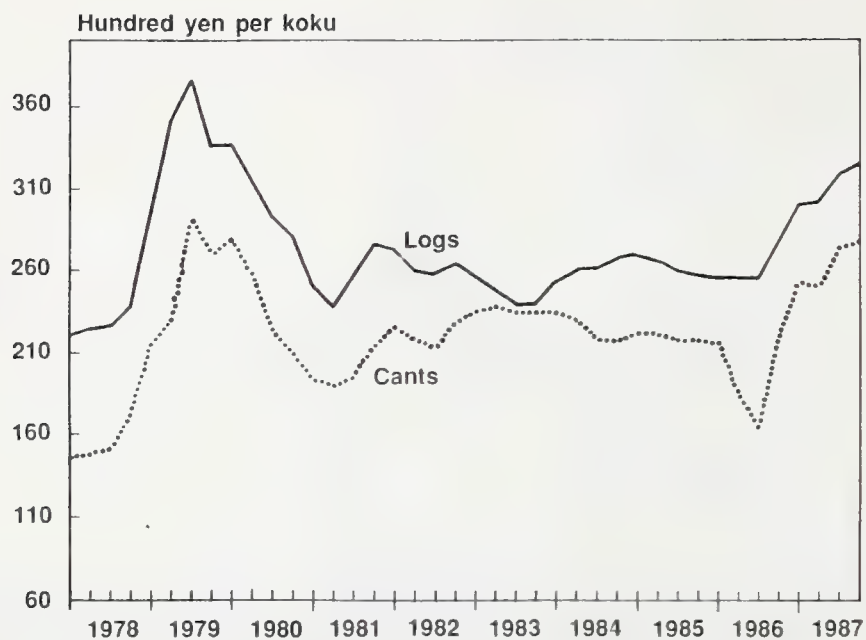


Figure 7—Prices in Japan for no. 1 spruce logs and grade A spruce cants.

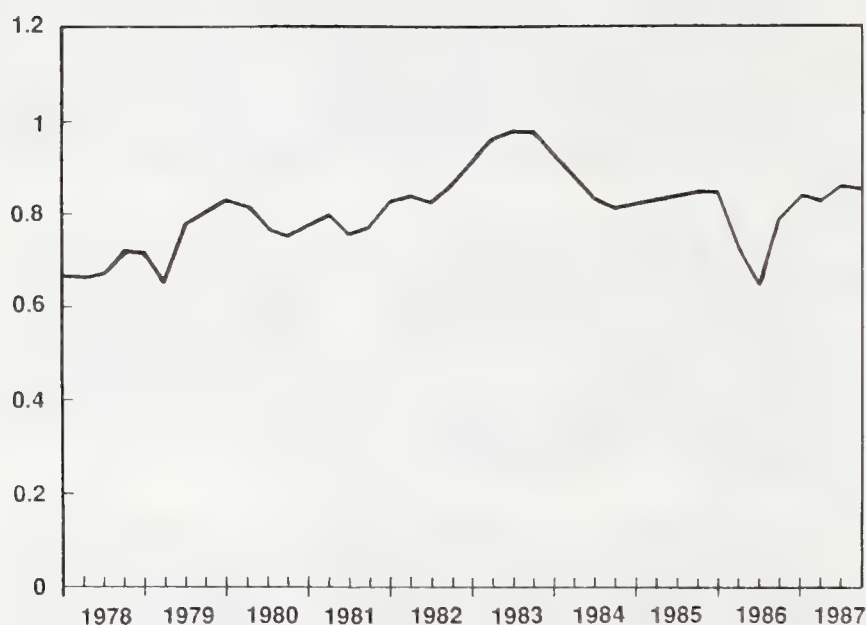


Figure 8—Ratio of prices in Japan for grade A spruce cants and no. 1 spruce logs.

Figure 7 charts prices in Japan for A grade spruce cants and Alaska number 1 spruce logs (Japan Lumber Journal 1979-88). The price ratio of cants to logs is given in figure 8. Figures 7 and 8 indicate that lumber prices pertinent to Alaska cants have declined relative to log prices, thereby providing a rationale for the declining relative share of cants among Alaska exports, at least in the better grades.

## Production Costs

Within Alaska, there may have been economic forces raising the offering prices of cants relative to logs, thereby discouraging purchase of sawn wood. It is not possible to distinguish offering prices from prices actually consummated in the marketplace and reported in export statistics; however, manufacturing-cost trends can be inferred from wage rates, generally the most significant cost factor aside from log inputs.



Between 1978 and 1986, average inflation-adjusted hourly earnings of production workers in the manufacturing industries of Alaska (mostly wood products) declined by 22 percent. This compares with a real-wage decline in Oregon, another recession-affected State, of 13 percent. It seems, then, that Alaska's production costs declined over the 8-year period and that they settled more rapidly than in a competing U.S. region. It follows that milling costs probably were not a factor pressing lumber's share of Alaska exports downward, and, if anything, because labor costs were rising in Japan (about 12 percent in real terms during the same period), processing in Alaska should have become increasingly appealing.

### Direct Displacement

The most common explanation offered for the relatively lesser role of lumber in Alaska's export offerings is that increasing supplies of logs entered the market, displacing cants. Between 1979 and 1985, the period of significant decline in cant exports, the cant-equivalent increase in log exports from Alaska exceeded the fall off of cant shipments by 44 percent. If there was direct, one-for-one displacement, the percentage should have been near zero. In any case, the direct-displacement argument weakens for the latter half of the 1980s, when Alaska log exports continued their upward trend, with cant exports reversing course and moving upward. If logs pushed cants away from the trade early in the decade, they pulled them back in later.

### Indirect Displacement

The tradeoff between logs and cants in Alaska and around the Pacific Rim is probably more complex than the direct displacement explanation indicates, involving first the effects of expanding log supplies on log prices and then the effect of lower log prices on cant purchases. These matters are discussed in order.

Our work on Alaska log markets has indicated a demand price elasticity<sup>4</sup> of about 9 in the export market (Flora and McGinnis 1989a). This is a high elasticity; large relative changes in log supplies are associated with small relative log-price changes.

After looking at how log prices change with changing log supplies, the next step is to assess the sensitivity of cant consumption to these price changes. The technical measure involved is cross demand—the effects of log-price changes on cant volumes purchased. High cross demand would mean that modest increases in log prices induce large drops in purchases of cants. Thus high cross demand could offset the damping effect of high log-price elasticity on cant buying.

Equations discussed in the appendix show that for every decline of one dollar in export log prices in Alaska, cant exports **increase** by 44 thousand board feet (Mbf), revealing a negative relation between log prices and cant volumes. A similar measure, cross elasticity of demand, also is negative: a 1-percent depression of log prices is associated with a 0.6-percent **rise** in cant shipments. These negative cross relations indicate that logs and cants are not competitors with each other; rather, they are complements. When demand for one rises, so does demand for the other.

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<sup>4</sup> Here, demand elasticity is the percentage change in volumes purchased when prices change by 1 percent; this is "price elasticity."



This finding is consistent with conclusions drawn by Gallagher and Mehrkens (1984). They viewed logs as goods-in-process. With logs an intermediate product in the manufacture of cants and then lumber, lower supply prices for either cants or logs would enhance demand for both, and the two would be considered complementary materials.

Our tradeoff results are based on quarterly data and therefore pertain to quarter-to-quarter, short-term market changes. It is possible that short-term interdependence differs from long-term interdependence; data limitations preclude an analytic comparison.

## The Select-Grade Log Market

We have estimated (Flora and McGinnis 1989a) that select grades account for about 20 percent of Alaska's log exports, about 1 percent of total Pacific Rim softwood log trade. In general, commodity groups that occupy a small share of their market have high demand elasticities even if demand for the product as a whole is inelastic (Flora and McGinnis 1989b). Alaska's select grades represent a market unto themselves, however (Kim and others 1988). It seems that (1) select grades occupy a niche not easily entered by lower quality products; (2) high prices of select grades do not reflect uses that involve a large fraction of wood consumption by Japanese households; and (3) products made from select-grade logs are "carriage trade" items, appealing to a clientele whose purchases are relatively insensitive to prices.

Although we do not have econometric estimates of demand for select cants and logs, the above three factors argue for very inelastic demand for select-grade cants and logs combined. And given Japanese millers' preference for logs when high quality is sought (Kim and others 1988), the use of select cants may be displaced by the use of logs. Cants in this grade category may be a residual or secondary commodity, employed only to the extent that logs cannot be obtained, over a wide range of log and cant prices.

Apparently, then, increases in top-graded log exports could have displaced high-graded cants. It seems doubtful that tradeoff behavior within a 20-percent segment of Alaska's log exports would have materially affected aggregate exports of cants in the early 1980s. That fractional log sector was the equivalent (in cant-equivalent terms) of only about 15 percent of cant exports.<sup>5</sup> In concert with a generally declining market, though, direct displacement within the select segment may have been a strongly contributing factor.

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<sup>5</sup> By 1988, 20 percent of log exports exceeded the entire cant-export segment.

## Conclusions

Several reasons for the decline of cant exports, in the face of rising log exports, have been explored. A combination of four seems likely. First, during the period of cant-export decline, Japanese demand for wood products was falling, affecting both cants and logs. Second, within Alaska's select-grade wood-products sector, with its inelastic demands for cants and logs, increasing harvests on private lands pushed private-log exports up despite lower offshore prices for logs. These two factors are, together, sufficient to explain the market shifts. They seem, however, to have operated in concert with two additional circumstances. Japanese prices for "super-grade" (their word) logs rose relative to super-grade lumber. And inelastic offshore demand for select logs and cants could have permitted increased log supplies from private lands to encroach on the cant share of this super-grade sector.

The latter two arguments of this four-part rationale are specific to the select-grade sector. The same arguments were inappropriate for Alaska logs and cants in general. Therefore, whether a decline in private log harvests will raise cant shipments depends on availability of a high-grade log supply from other, public sources.

Meanwhile, several factors not analyzed here are operating to Alaska's advantage in the lumber market. The 1985-88 decline in the value of the dollar, if sustained, will keep Japan's sawmilling costs in Japan near or above those in the United States. With diminished supplies of private old-growth timber in states other than Alaska, cants and lumber are becoming the principal entree to high-grade lumber, reflecting the fact that Federal timber in the United States cannot be exported without primary processing. Finally, marketing efforts in Japan, led by Canadian and U.S. lumber and plywood trade groups, are increasing in scope and intensity. It follows that future exports of Alaska sawn products may be influenced more by growing demand offshore than by competition from Alaska logs.

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## Appendix

### Units of Measure

Unless indicated otherwise, volumes are expressed in millions of board feet (Scribner log scale); millions of board feet, lumber tally; and thousands of cubic meters. Widely used conversion factors are 4.5 cubic meters per thousand board feet (Mbf) for logs and 2.36 cubic meters per Mbf for lumber and cants. Cant-equivalent volumes were estimated by multiplying log volumes by 1.8.

Prices are generally expressed in dollars per Mbf. Japanese prices in figures 7 and 8 are in hundreds of yen per koku. For both logs and lumber, a koku is stated as equaling about 120 board feet (Japan Lumber Journal 1979-88). For logs, this is board feet in Brereton scale. There are about 1.8 Brereton board feet per Scribner board foot.

### Elasticity Estimates

The price-elasticity figures used here were taken from demand-and-supply equations estimated for wood products being moved to Japan.

#### Supply of Alaska logs—

$$\begin{aligned} \text{LnLogvol} = & 2.3524 + 1.3323 \text{ LnLogP} + 0.2729 \text{ Dummy1} - 1.0318 \text{ Dummy2} \\ & [0.53] \quad [2.02] \quad [3.87] \quad [-2.23] \\ & + 0.1293 \text{ LnUSIndP} \\ & [0.09] \\ R^2 = & 0.88 \quad F = 24 \quad DW = 1.35 \quad \text{Data 1970-87} \end{aligned}$$

#### Supply of Alaska lumber—

$$\begin{aligned} \text{LnLbrVol} = & 10.9461 + 0.8304 \text{ LnLbrPrice} - 1.8706 \text{ LnHrWage} \\ & [15.41] \quad [5.27] \quad [-13.21] \\ R^2 = & 0.94 \quad F = 110 \quad DW = 1.45 \quad \text{Data 1970-87} \end{aligned}$$

#### Cross demand, lumber volume and log price—

$$\begin{aligned} \text{LbrVol} = & 22738 - 44.04 \text{ LogPrice} + 2.89 \text{ Area} - 5358 \text{ Lend} \\ & [1.32] \quad [-2.07] \quad [4.68] \quad [-4.24] \\ R^2 = & 0.74 \quad F = 34 \quad DW = 1.67 \quad \text{Data 1978.1-87.4} \end{aligned}$$

#### Cross elasticity, lumber volume and log price—

$$\begin{aligned} \text{LnLbrVol} = & -2.7876 - 0.6041 \text{ LnLogPrice} + 1.9418 \text{ LnArea} \\ & [-0.24] \quad [-1.45] \quad [2.78] \\ & + 1.4522 \text{ LnLend} - 1.0767 \text{ LnIndP} \\ & [2.17] \quad [-1.04] \\ R^2 = & 0.64 \quad F = 13 \quad DW = 2.18 \quad \text{Data 1978.1 - 1987.4} \end{aligned}$$

T-values are in brackets; DW is the Durbin-Watson statistic.

Ln...	=	Logarithm of a variable.
Area	=	Floor area of wooden structures built in Japan during the period, in thousand square meters.
Dummy1	=	Linear dummy; 1980 = 1, 1987 = 8, zero previously.
Dummy2	=	Dummy; 1975 = 1, other years = 0.
HrWage	=	Average wage rate, U.S. wood products industry, in dollars per hour.
Indp	=	Japanese industrial production index; 1980 = 100.
LbrPrice	=	Price of Alaska lumber (cant) exports, in dollars per thousand board feet.
LbrVol	=	Volume of Alaska lumber (cant) export, in thousand board feet.
Lend	=	Japanese average lending rate by banks, corresponding to U.S. prime rates.
LogPrice	=	Average dockside-unit value of softwood logs exported from Alaska to Pacific Rim nations outside North America, in dollars per thousand board feet.
USIndP	=	U.S. industrial production index; 1980 = 100.











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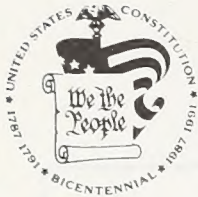
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